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REACTIVE INHIBITION (THE HULLIAN CONSTRUCT) AND ACHIEVEMENT IN READING.

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THIS PAPER SUMMARIZED THE RESULTS OF SEVERAL STUDIES CONDUCTED BY THE AUTHOR TO (1) INVESTIGATE THE GENERALITY OF THE RELATIONSHIP BETWEEN REACTIVE INHIBITION AND ACHIEVEMENT AND (2) DETERMINE FACTORS THAT AFFECT INHIBITORY POTENTIAL. THESE STUDIES WERE MADE WITH A VARIETY OF SAMPLE GROUPS. RELATIONSHIPS BETWEEN REACTIVE INHIBITION AND ACHIEVEMENT IN READING, SPELLING, AND HANDWRITING WERE DEMONSTRATED. GIVEN A FAIRLY LOW LEVEL OF MOTIVATION, POOR ACHIEVERS APPEARED TO ACCUMULATE REACTIVE INHIBITION MORE RAPIDLY THAN GOOD ACHIEVERS. THERE WAS EVIDENCE THAT THE GOOD ACHIEVER'S PERFORMANCE AND TENDENCY TO ACCUMULATE REACTIVE INHIBITION INCREASE WHEN MOTIVATION IS INCREASED, BUT NO SUCH RELATIONSHIP WAS DEMONSTRATED WITH THE POOR ACHIEVER. IN ADDITION, THE AUTHOR TENTATIVELY SUGGESTED THAT ANXIETY ALSO PLAYS AN IMPORTANT ROLE IN PRODUCING REACTIVE INHIBITION, ALTHOUGH THIS RELATIONSHIP WAS NOT CLEARLY SHOWN. BASED ON HIS VARIOUS FINDINGS, THE AUTHOR TO ACCUMULATE REACTIVE INHIBITION INCREASED WHEN MOTIVATION ACCUMULATE MUCH REACTIVE INHIBITION AND POOR ACHIEVEMENT. HE WARNS, HOWEVER, THAT HE DOES NOT SUGGEST THAT SUCH A TENDENCY IS A "MAJOR" CAUSE FOR READING DISABILITY. THIS PAPER WAS PRESENTED AT THE NATIONAL READING CONFERENCE (DALLAS, DECEMBER 1965). (JH)

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(A paper presented at the National Reading Conference annual meeting, Dallas, December, 1965)

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REACTIVE INHIBITION (THE HULLIAN CONSTRUCT) AND ACHIEVEMENT IN READING*

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According to Hullian learning theory, a person accumulates reactive inhibition - which is akin to tissue injury, fatigue or pain - as he performs a given task. (1:137) This amounts to a

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negative drive that detracts from reaction potential. Thus, Lynn (3) argued that if the theory that early acquisition of basic educational skills is a matter of conditioning (8) is correct, pupils who learn these skills readily should generate reactive inhibition slowly. The data (3, 7) support the prediction for the specific skill area of reading: poor readers dissipate more reactive inhibition during rest than do good readers. The purpose here is to summarize the results of studies designed to investigate the generality of the relationship between reactive inhibition and achievement and to examine factors that may affect inhibitory potential.

An inverted-number printing task was used in all of the studies to quantify reactive inhibition. Subjects printed inverted-numbers from 1 to 10 for 12 massed 30-second trials, rested 5-minutes, and had four more massed trials. The assumption is that reminiscence (the gain in postrest over prerest performance) reflects the amount of reactive inhibition dissipated. Table 1 shows mean numbers printed on first and last prerest and first postrest trials by all groups considered here. Note the sharp postrest gains in performance. Reference is made in the discussion to results of comparisons of acquisition (prerest) and reminiscence gains; the comparisons were made by repeated measures analyses of variance, specifics of which are given in the original reports.

A study of 60 Negro subjects in grades 4, 5, and 6 replicated results obtained with all white subjects. (6) That is, analyses of good and poor readers' performance on reminiscence trials (Trials 12 and 13) revealed a Trial X Achievement Level inter-

Table 1

Mean Numbers Printed on Selected Trials

Main Group	Sub Group	Trial 1	Trial 12	Trial 13
Reading (Negro Ss)	Good	8.8	11.1	14.2
	Poor	8.0	8.5	13.1
Writing	Good	8.6	10.4	13.2
	Poor	8.4	9.2	14.1
Spelling	Good	8.8	10.9	13.2
	Poor	8.8	9.8	13.7
Arithmetic	Good	12.0	14.6	19.8
	Poor	9.6	10.3	14.9
Spelling	Good (Hi)	12.2	13.5	18.9
	Poor (Lo)	8.3	9.9	13.8
Reading	Good (Lo)	8.3	10.9	13.5
	Poor (Hi)	7.4	8.9	13.1
Low Motivation	Hi Anx	8.0	10.0	12.6
	Lo Anx	7.5	9.4	11.9
High Motivation	Hi Anx	7.8	7.7	13.9
	Lo Anx	9.0	9.8	14.2

action, which demonstrated the statistical significance ($p < .05$) of poor readers' greater gains (see Table 1). Thus, poor readers dissipated more reactive inhibition during rest than did good readers. Furthermore, good and poor readers did not differ on Trial 1, but by Trial 12 good readers were producing more inverted numbers; and analyses revealed a significant Trial X Achievement Level interaction. The interpretation was that poor readers' performance was depressed by rapidly accumulating reactive inhibition, which was dissipated during rest. The data thereby supported the previously untested assumption that poor readers accumulate reactive inhibition more rapidly than do good readers. The previous studies considered here had shown greater dissipation only. The study demonstrates the generality of the relationship of reading achievement and reactive inhibition with Negro pupils and a white examiner. The latter seems particularly significant in view of factors - recently reviewed by Katz (2) - that may influence Negroes' test performance; that is, a number of variables might have acted to invalidate the inverted-number printing task as a measure of reactive inhibition.

The relationship between inhibitory potential and skill attainment in the basic skill areas of arithmetic, handwriting, and spelling was examined in another study. (5) Subjects were 220 good and poor achievers in the several skill areas from grade four through eight. The predicted relationship was demonstrated for handwriting and spelling: the poor achievers dissipated more reactive inhibition during rest than did the good achievers. But the relationship did not hold for arithmetic: the good achievers produced many more digits than the poor achievers (see Table 1)

and they did not differ from poor achievers in reactive inhibition dissipated during rest.

In a Hullian framework, increased motivation should cause both increased performance and - because there is less resting while working and, therefore, less spontaneous dissipation of reactive inhibition - greater accumulation of reactive inhibition. The validity of such a prediction was supported by the results of an earlier study by Wasserman (10). Thus, there was support for speculation that the performance of good achievers in arithmetic may have been due to inherent motivation to do well on a success associated task like number-printing. If this is in fact true, then high extrinsic motivation should produce similar results with good achievers in other skill areas. Furthermore, the related expectation would be that increased motivation would worsen poor achievers' already present tendency to accumulate reactive inhibition rapidly. Another study (5), reported in the same article as the study just described, was designed to test these notions.

In the first phase of the study, 60 good and poor spellers in grades four through six served as subjects. Procedures of the earlier studies were replicated, except that good spellers were given instructions intended to be highly motivating. Whereas the original instructions were designed merely to secure cooperation without anxiety, the revised instructions were designed to produce ego involvement in the inverted-number printing task and, presumably, higher motivation. With the revised instructions good spellers' performance was similar to that of good achievers in arithmetic. In fact, they not only produced more digits, but they also dissipated significantly more reactive inhibition than the

poor spellers, which was in complete accord with the prediction. In the second phase, 60 good and poor readers in grades four through six were subjects, but the poor readers got the revised instructions. Here the results did not support the prediction. The ostensibly highly motivated poor readers produced no more inverted-numbers than the good readers although they did, as before, dissipate more reactive inhibition during rest. The revised instructions, then, had no clear effect upon poor readers' performance. Whether highly motivated poor achievers simply cannot produce more digits or whether motivating instructions have no effect or even a debilitating effect upon poor achievers' performance is not clear from the data. The possibility that motivating instructions may have differential effects upon the performance of good and poor achievers is intriguing. Studies like one recently reported by Van De Riet (9), where the suggestion was that good and poor achievers respond differently to praise and reproof, lend some support to such a notion.

A final study (4) examined the relationship between subjects' anxiety level and inhibitory potential. Equating anxiety to drive, the prediction is that high anxiety subjects will produce more work and accumulate more reactive inhibition than low anxiety subjects in a given period of time. One main purpose of the study was to test the validity of the prediction. A second purpose was to examine the effect of different levels of motivation. The notion was that different motivation levels might produce different results with high and low anxiety subjects, just as with good and poor achievers. The Children's Manifest Anxiety Scale was used to identify 120 pupils in grades four through six who scored

high (top 20%) or low (bottom 20%) on the scale. Equal numbers of subjects were given instructions indended to evoke high or low motivation. Performances of high and low anxious subjects with high motivation and high and low anxious subjects with low motivation were compared by analyses of variance. The expectation was only partially confirmed. With high motivation, high anxiety subjects accumulated more reactive inhibition than low anxiety subjects; but with low motivation high and low anxiety groups did not differ. The suggestion was that anxiety level may become a relevant factor only after a critical level of motivation has been reached. Support is thereby implied for further speculation regarding the possible differential effects of motivation level upon the performance of good and poor achievers.

To sum up, a relationship between reactive inhibition and attainment in reading, spelling, and handwriting has been demonstrated. Given a fairly low level of motivation, poor achievers appear to accumulate reactive inhibition more rapidly than good achievers. There is evidence that good achievers' performance and tendency to accumulate reactive inhibition increase when motivation is increased; but no such relationship has been demonstrated with poor achievers. The role of anxiety level in producing such results is not yet clear; but it does seem clear that both anxiety and motivation levels ought to be considered in making predictions regarding inhibitory potential for the time being. The fact remains, however, that what we have rather arbitrarily termed anxiety and motivation are, in the present framework, aspects of total drive. Ultimately we should seek clarification of the nature, role and interaction of these and

other aspects of drive and their effect on inhibitory potential.

It seems reasonable to hypothesize a causal relationship between the tendency to accumulate much reactive inhibition and poor achievement - at least in certain skills - despite the fact that Hull's notion of conditioned inhibition has fallen into disrepute. Inefficient learning precipitated by too rapid accumulation of reactive inhibition could account for lack of early skill mastery and resultant chronic underachievement without dependence upon the construct of conditioned inhibition. That underachievers respond to remedial teaching bespeaks the fact that their disability is not permanent. Studies that manipulate distribution of practice should help to clarify the role, if any, of reactive inhibition as a cause for learning problems.

Even the most optimistic believer in the relationships discussed here would not suggest at this point that a tendency toward rapid accumulation of reactive inhibition is a major - or even secondary, for that matter - cause of reading disability. Perhaps performance that is here interpreted as evidence of rapid accumulation of reactive inhibition and poor performance in reading share a common underlying cause. One might argue, for example, that a poor readers' repeated failures lead him to withdraw more quickly from sustained academic-type work, despite reasonable initial effort. Nevertheless, the investigations of inhibitory potential and achievement give rise to some provocative questions. Answers to provocative questions are always worth seeking, regardless of where they may lead.

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